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ABSTRACT

Described is the development of a test of inductive reasoning for fifth graders by Max Jerman. Nine test items were selected from the French Kit on the basis of pretest statistics; each item has eight parts. Appendices to the brief description include item and scale statistics and a matrix of correlations between scales and total score. (SD)

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SMESG RESEARCH AND ANALYSIS SECTION

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Working Paper No. 3

By: E. G. Begle

Subject: Inductive Reasoning Test for Grade Five

As part of his dissertation project, Max Jerman tried to construct an inductive reasoning test that would be suitable for fifth grade students. He started by administering both forms of the French Kit Test "Figure Classification" to a group of fifth graders. The directions given these students were precisely those in the French Kit; however, it was made clear to the students that they were not expected to complete either part by telling them to do as many as they could in the allotted time.

Item and scale statistics were computed, including percent not tried and correlations between items and total score. On the basis of these statistics, nine items were selected as being appropriate for fifth grade students. These items are reproduced in Appendix A.

The location of these items in the French Kit is as follows:

<u>Jerman No.</u>	<u>French Kit Location</u>
1	Form 1, Item 3
2	Form 1, Item 4
3	Form 1, Item 5
4	Form 2, Item 3
5	Form 2, Item 6
6	Form 1, Item 6
7	Form 2, Item 7
8	Form 1, Item 7
9	Form 2, Item 5

It will be noted that each item consists of three exemplars of a particular concept and three non-exemplars, followed by eight figures, each of which was to be labeled either as an exemplar or as a non-exemplar of the concept, the total number of responses thereby being 72.

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These nine items were administered in the fall of 1970 to approximately 300 fifth grade students. The eight responses for each item were treated as an eight-item scale. Summary statistics for these nine scales are shown in Appendix B. It will be noted that scale statistics for all items except No. 4 are quite satisfactory.

Intercorrelations between these scales and also the total 72-response test are shown in Appendix C.

With item 4 omitted, the remaining eight items seem to constitute a statistically satisfactory test of inductive reasoning for fifth grade students.

A closer inspection, however, of the correlation matrix in Appendix C indicates that the first three items cluster together, as do the last five. It is suggested that in any future use of this instrument all eight scales (64 responses) be used, and both the total score and a score based on the last forty responses be computed and compared. It may be that the latter score will turn out to be more useful but, if so, the entire eight scales should probably be administered in all cases, with the first three considered as a warm-up.

APPENDIX A PAGES 1-4 REMOVED
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APPENDIX B
Item and Scale Statistics

ITEM1

SCALE STATISTICS:

NUMBER OF CASES = 280
NUMBER OF VARIABLES = 8
MEAN TOTAL SCORE = 6.168
STANDARD DEVIATION = 2.119
CRONBACH'S ALPHA = 0.755
ERROR OF MEASUREMENT = 0.958

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. P'S	PERCENT NT
1	0.804	0.824	0.641	2.500
2	0.825	0.843	0.765	2.143
3	0.579	0.600	0.643	3.571
4	0.779	0.804	0.887	3.214
5	0.821	0.855	0.536	3.929
6	0.739	0.779	0.697	3.929
7	0.811	0.838	0.864	3.214
8	0.811	0.852	0.670	5.000

ITEM2

SCALE STATISTICS:

NUMBER OF CASES = 280
NUMBER OF VARIABLES = 9
MEAN TOTAL SCORE = 6.336
STANDARD DEVIATION = 1.090
CRONBACH'S ALPHA = 0.770
ERROR OF MEASUREMENT = 0.936

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. P'S	PERCENT NT
9	0.871	0.894	0.916	2.500
10	0.629	0.662	0.482	6.071
11	0.800	0.830	0.564	3.571
12	0.821	0.861	0.880	4.643
13	0.861	0.889	0.886	3.214
14	0.871	0.907	0.842	3.929
15	0.800	0.836	0.710	4.286
16	0.662	0.713	0.526	4.286

ITEM 3

SCALE STATISTICS:

NUMBER OF CASES = 280
 NUMBER OF VARIABLES = 8
 MEAN TOTAL SCORE = 5.750
 STANDARD DEVIATION = 2.265
 CRONBACH'S ALPHA = 0.714
 ERROR OF MEASUREMENT = 1.053

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
17	0.700	0.775	0.601	9.643
18	0.721	0.783	0.743	9.971
19	0.689	0.766	0.543	10.000
20	0.689	0.757	0.560	8.329
21	0.743	0.816	0.691	8.923
22	0.779	0.849	0.861	9.214
23	0.714	0.781	0.590	8.971
24	0.713	0.806	0.607	11.429

ITEM 4

SCALE STATISTICS:

NUMBER OF CASES = 280
 NUMBER OF VARIABLES = 8
 MEAN TOTAL SCORE = 4.833
 STANDARD DEVIATION = 1.450
 CRONBACH'S ALPHA = 0.415
 ERROR OF MEASUREMENT = 1.253

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
25	0.839	0.883	0.403	5.000
26	0.457	0.432	0.213	5.714
27	0.482	0.511	0.293	5.714
28	0.604	0.648	0.182	6.786
29	0.600	0.645	0.249	7.143
30	0.675	0.727	0.297	7.143
31	0.686	0.733	0.392	6.429
32	0.300	0.324	-0.105	7.500

ITEMS

SCALE STATISTICS:

NUMBER OF CASES = 240
 NUMBER OF VARIABLES = 9
 MEAN TOTAL SCORE = 5.457
 STANDARD DEVIATION = 2.100
 CROSBACH'S ALPHA = 0.726
 ERROR OF MEASUREMENT = 1.100

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
32	0.704	0.782	0.712	10.300
36	0.636	0.718	0.448	11.071
38	0.384	0.040	0.947	9.920
39	0.557	0.517	0.405	9.643
37	0.475	0.520	0.458	10.357
34	0.700	0.772	0.650	9.286
30	0.471	0.743	0.472	9.643
40	0.450	0.941	0.377	9.643

ITEMS

SCALE STATISTICS:

NUMBER OF CASES = 240
 NUMBER OF VARIABLES = 9
 MEAN TOTAL SCORE = 3.771
 STANDARD DEVIATION = 2.164
 CROSBACH'S ALPHA = 0.710
 ERROR OF MEASUREMENT = 1.165

ITEM STATISTICS:

ITEM	PIS	ADJ. PIS	N.S. PIS	PERCENT NT
41	0.132	0.160	0.292	17.500
42	0.621	0.744	0.594	16.429
43	0.407	0.494	0.516	17.500
44	0.663	0.903	0.620	16.786
45	0.532	0.766	0.653	17.500
46	0.518	0.642	0.575	19.286
47	0.418	0.520	0.385	21.071
40	0.375	0.472	0.479	21.736

ITEM7

SCALE STATISTICS:

NUMBER OF CASES = 290
 NUMBER OF VARIABLES = 8
 MEAN TOTAL SCORE = 4.168
 STANDARD DEVIATION = 2.618
 CRONBACH'S ALPHA = 0.930
 ERROR OF MEASUREMENT = 1.079

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
49	0.725	0.931	0.932	22.143
50	0.582	0.753	0.770	23.214
51	0.632	0.931	0.952	23.929
52	0.550	0.750	0.347	27.500
53	0.293	0.405	0.429	27.857
54	0.454	0.632	0.618	28.214
55	0.464	0.647	0.648	28.214
56	0.463	0.642	0.608	27.857

ITEM9

SCALE STATISTICS:

NUMBER OF CASES = 280
 NUMBER OF VARIABLES = 8
 MEAN TOTAL SCORE = 2.389
 STANDARD DEVIATION = 2.223
 CRONBACH'S ALPHA = 0.744
 ERROR OF MEASUREMENT = 1.125

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
57	0.621	0.879	0.921	29.286
58	0.171	0.244	0.365	29.643
59	0.357	0.518	0.472	31.071
60	0.350	0.538	0.623	35.000
61	0.364	0.545	0.666	33.214
62	0.446	0.668	0.694	33.214
63	0.282	0.454	0.392	37.857
64	0.296	0.474	0.508	37.500

ITEMS

SCALE STATISTICS:

NUMBER OF CASES = 280
 NUMBER OF VARIABLES = 8
 MEAN TOTAL SCORE = 2.064
 STANDARD DEVIATION = 2.067
 CROSBACH'S ALPHA = 0.753
 ERROR OF MEASUREMENT = 1.030

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
65	0.114	0.196	0.304	41.786
66	0.261	0.448	0.504	41.786
67	0.180	0.340	0.512	44.286
68	0.396	0.706	0.773	45.357
69	0.196	0.372	0.550	47.143
70	0.417	0.772	0.713	46.786
71	0.271	0.517	0.746	47.500
72	0.235	0.449	0.718	47.500

APPENDIX C

Intercorrelations between Scales and Total Score

	2	3	4	5	6	7	8	9	10
1	.58	.33	.05	.18	.03	.05	-.05	-.04	.41
2		.50	.14	.24	.05	.15	.03	.00	.51
3			.22	.26	.15	.23	.09	.10	.56
4				.40	.28	.18	.17	.08	.46
5					.47	.41	.30	.24	.68
6						.42	.29	.20	.57
7							.67	.49	.73
8								.65	.64
9									.54